CLAIMS

1. Weldable component of structural steel, characterized in that its chemical composition comprises, by weight:

$$0.10\% \leq C \leq 0.22\%$$
$$0.50\% \leq Si \leq 1.50\%$$
$$Al \leq 0.9\%$$
$$0\% \leq Mn \leq 3\%$$
$$0\% \leq Ni \leq 5\%$$
$$0\% \leq Cr \leq 4\%$$
$$0\% \leq Cu \leq 1\%$$
$$0\% \leq Mo + W/2 \leq 1.5\%$$
$$0.0005\% \leq B \leq 0.010\%$$
$$N \leq 0.025\%$$

optionally at least one element selected from V, Nb, Ta, S and Ca, at contents of less than 0.3%, and/or from Ti and Zr at contents of less than or equal to 0.5%, the remainder being iron and impurities resulting from the production operation,

the contents of aluminium, boron, titanium and nitrogen, expressed in thousandths of %, of the composition also satisfying the following relationship:

$$B \geq \frac{1}{3} \times K + 0{,}5, \qquad (1)$$

with $K =$ Min (I^* ; J^*)

$I^* =$ Max (0 ; I) and $J^* =$ Max (0 ; J)

$$I = \text{Min}\left(N \; ; \; N - 0{,}29\left(Ti - 5\right)\right)$$

$$J = \text{Min}\left(N \; ; \; 0{,}5\left(N - 0{,}52 \; Al + \sqrt{(N - 0{,}52\,Al)^2 + 283} \right) \right),$$

the contents of silicon and aluminium of the composition also complying with the following conditions:

if $C > 0.145$, then $Si + Al < 0.95$

and whose structure is bainitic, martensitic or martensitic-bainitic and also comprises from 3 to 20% of residual austenite.

2. Steel component according to claim 1, characterized in that its chemical composition also satisfies the following relationship:

$$1.1\%Mn + 0.7\%Ni + 0.6\%Cr + 1.5(\%Mo + \%W/2) \geq 1 \qquad (2)$$

3. Steel component according to claim 2, characterized also in that its chemical composition satisfies the following relationship:

$$1.1\%Mn + 0.7\%Ni + 0.6\%Cr + 1.5(\%Mo + \%W/2) \geq 2 \qquad (2)$$

4. Steel component according to any one of claims 1 to 3, characterized in that its chemical composition also satisfies the following relationship:

$$\%Cr + 3(\%Mo + \%W/2) \geq 1.8.$$

5. Steel component according to claim 4, characterized in that its chemical composition also satisfies the following relationship:

$$\%Cr + 3(\%Mo + \%W/2) \geq 2.0.$$

6. Method for manufacturing a weldable steel component according to any one of claims 1 to 5, characterized in that

- the component is austenitized by heating at a temperature of from Ac_3 to 1000°C, and it is then cooled to a temperature of less than or equal to 200°C, in such a manner that, at the core of the component, the rate of cooling between 800°C and 500°C is greater than or equal to the critical bainitic velocity,
- optionally, tempering is effected at a temperature of less than or equal to Ac_1.

7. Method according to claim 6, characterized in that, at the core of the component, the cooling rate between 500°C and a temperature of less than or equal to 200°C is from 0.07°C/s to 5°C/s .

8. Method according to claim 6 or 7, characterized in that tempering is effected at a temperature of less than 300°C for a period of time of less than 10 hours, at the end of the cooling operation to a temperature of less than or equal to 200°C.

9. Method according to claim 6 or 7, characterized in that no tempering is carried out at the end of the cooling operation to a temperature of less than or equal to 200°C.

10. Method for manufacturing a weldable steel plate according to any one of claims 1 to 5, the thickness of which is from 3 mm to 150 mm,

characterized in that the plate is quenched, the cooling rate V_R at the core of the component between 800°C and 500°C and the composition of the steel being such that:

$$1.1\%Mn + 0.7\%Ni + 0.6\%Cr + 1.5(\%Mo + \%W/2) + \log V_R \geq 5.5.$$

11. Method for manufacturing a weldable steel plate according to claim 10, the thickness of which is from 3 mm to 150 mm, characterized, in addition, in that the plate is quenched, the cooling rate V_R at the core of the component between 800°C and 500°C and the composition of the steel being such that:

$$1.1\%Mn + 0.7\%Ni + 0.6\%Cr + 1.5(\%Mo + \%W/2) + \log V_R \geq 6.$$